

1 **CLAIMS**

2 1. A computing device comprising:
3 a computer-readable medium;
4 a context service module on the computer-readable medium and configured
5 to process information from multiple context providers to determine a current
6 device context; and

7 a common context provider interface configured to receive information
8 from the multiple context providers, which information can then be provided to
9 the context service module by the interface.

10 2. The computing device of claim 1 embodied as a mobile computing
11 device.

13 3. The computing device of claim 1 embodied as a desktop computing
14 device.

16 4. The computing device of claim 1, wherein the multiple context
17 providers comprise multiple different location providers.

19 5. The computing device of claim 1, wherein the common context
20 provider interface is configured to constantly receive information from one or
21 more of the context providers.

1 6. The computing device of claim 1, wherein the common context
2 provider interface is configured to periodically receive information from one or
3 more of the context providers.

4

5 7. The computing device of claim 6, wherein the information can be
6 received periodically at specified times.

7

8 8. The computing device of claim 6, wherein the information can be
9 received periodically on the occurrence of specified events.

10

11 9. The computing device of claim 6, wherein the information can be
12 received on the request of the context service module.

13

14 10. The computing device of claim 6, wherein the information can be
15 received:

16 periodically at specified times;

17 periodically on the occurrence of specified events; or

18 on the request of the context service module.

19

20 11. The computing device of claim 1, wherein the information from the
21 multiple context providers includes one or more confidence parameters that
22 provide a measure of a provider's confidence in the information.

1 **12.** The computing device of claim 1, wherein the information from the
2 multiple context providers includes one or more accuracy parameters that provide
3 a measure of the accuracy of a provider's information.

4

5 **13.** The computing device of claim 1, wherein the information from the
6 multiple context providers includes:

7 one or more confidence parameters that provide a measure of a provider's
8 confidence in the information; and

9 one or more accuracy parameters that provide a measure of the accuracy of
10 a provider's information.

11

12 **14.** The computing device of claim 1, wherein the multiple context
13 providers are configured to receive information from one or more location sources
14 and provide the information to the context service module via the common context
15 provider interface.

16

17 **15.** The computing device of claim 14, wherein at least some of the
18 context providers are different and receive different forms of information.

19

20 **16.** The computing device of claim 14, wherein at least some of the
21 context providers are configured to process the information that is received from
22 their source to provide specific information that is directly used by the context
23 service module to ascertain a device location.

17. A computing device comprising:

- a computer-readable medium;
- a location service module embodied on the computer-readable medium; and
- multiple different location providers configured to receive information from one or more different sources of information and process the information to provide location information to the location service module,
- the location service module being configured to process the location information to provide a current device location.

18. The computing device of claim 17 embodied as a mobile computing device.

19. The computing device of claim 17 embodied as a desktop computing device.

20. The computing device of claim 17, wherein one or more of the location providers are configured to self-monitor their operation and to inform the location service module of an operation irregularity.

21. The computing device of claim 17, wherein one or more of the location providers are configured to assign confidence parameters to the information that is provided to the location service module, the confidence parameters providing a measure of a provider's confidence in the information.

1 **22.** The computing device of claim 17, wherein one or more of the
2 location providers are configured to assign accuracy parameters to the information
3 that is provided to the location service module, the accuracy parameters providing
4 a measure of the accuracy of a provider's information.

5

6 **23.** The computing device of claim 17, wherein one or more of the
7 location providers are configured to:

8 assign confidence parameters to the information that is provided to the
9 location service module, the confidence parameters providing a measure of a
10 provider's confidence in the information; and

11 assign accuracy parameters to the information that is provided to the
12 location service module, the accuracy parameters providing a measure of the
13 accuracy of a provider's information.

14

15 **24.** The computing device of claim 17, wherein one or more of the
16 location providers are configured to continuously update information that is
17 provided to the location service module.

18

19 **25.** The computing device of claim 17, wherein one or more of the
20 location providers are configured to periodically update information that is
21 provided to the location service module.

22

23 **26.** The computing device of claim 25, wherein the one or more location
24 providers are configured to update the information at specified times.

1 **27.** The computing device of claim 25, wherein the one or more location
2 providers are configured to update the information on the occurrence of specified
3 events.
4

5 **28.** The computing device of claim 17, wherein one or more of the
6 location providers are configured to receive a request from the location service
7 module and update the information that is provided to the location service module
8 based on the request.
9

10 **29.** The computing device of claim 17, wherein the computing device
11 comprises a hand-held mobile computing device.
12

13 **30.** The computing device of claim 17, wherein the computing device is
14 configured to accommodate dynamically adding or removing one or more location
15 providers.
16

17 **31.** The computing device of claim 17, wherein the computing device is
18 configured to continue operation when one or more of the location providers stops
19 functioning.
20
21
22
23
24
25

1 **32.** The computing device of claim 17, further comprising a hierarchical
2 tree structure comprising multiple nodes that are each assigned a unique
3 identification, the nodes representing geographical divisions of the Earth, the
4 location service module being configured to traverse at least some of the nodes to
5 provide the current device location.

6

7 **33.** The computing device of claim 32, wherein one or more of the
8 location providers are configured to process the information and provide the
9 unique identification for one of the nodes of the hierarchical tree structure.

10

11 **34.** A method of determining the location of a computing device
12 comprising:

13 providing multiple location providers that are configured to provide
14 location information that pertains to a current location of the computing device;

15 receiving location information from the multiple location providers using a
16 common interface;

17 using the information that is received from the multiple location providers
18 to ascertain a current device location.

19

20 **35.** The method of claim 34, wherein the common interface
21 accommodates multiple location providers that are different.

1 **36.** The method of claim 34, wherein the receiving of the location
2 information comprises continuously receiving location information from at least
3 one of the location providers.
4

5 **37.** The method of claim 34, wherein the receiving of the location
6 information comprises periodically receiving location information from at least
7 one of the location providers.
8

9 **38.** The method of claim 37, wherein the receiving of the information
10 comprises receiving the information at specific times.
11

12 **39.** The method of claim 37, wherein the receiving of the information
13 comprises receiving the information on the occurrence of specific events.
14

15 **40.** The method of claim 37, wherein the receiving of the information
16 comprises receiving the information responsive to a request to receive the
17 information.
18

19 **41.** One or more computer-readable media having computer-readable
20 instructions thereon which, when executed by a computing device, cause the hand-
21 held mobile computing device to:
22

23 provide multiple different location providers that are configured to provide
location information that pertains to a current location of the computing device;
24

25 receive location information from the multiple different location providers
using a common interface; and

1 use the information that is received from the multiple location providers to
2 ascertain a current device location.

3

4 **42.** The computer-readable media of claim 41, wherein the instructions
5 cause the computing device to traverse a hierarchical tree structure comprising
6 multiple nodes that represent physical or logical entities in order to ascertain the
7 current device location.

8

9 **43.** A method of determining the location of a mobile computing device
10 comprising:

11 providing multiple different location providers that are configured to
12 provide location information that pertains to a current location of the computing
13 device;

14 monitoring one or more of the location providers;

15 assigning a confidence parameter to location information that is provided
16 by one or more providers, the confidence parameter providing a measure of a
17 provider's confidence in its location information; and

18 sending the location information and the confidence parameter to a location
19 service module on the mobile computing device, the location service module being
20 configured to use the location information and the confidence parameter to
21 ascertain a current device location.

1 **44.** The method of claim 43 further comprising assigning an accuracy
2 parameter to the location information that is provided by one or more providers,
3 the accuracy parameter providing a measure of the accuracy of a provider's
4 location information.

5
6 **45.** The method of claim 43 further comprising responsive to the
7 monitoring, notifying the location service module upon the occurrence of an
8 operation irregularity.

9
10 **46.** The method of claim 43 further comprising receiving a location
11 query and responding to the query with a location provider.

12
13 **47.** The method of claim 43, wherein one or more of the location
14 providers are configured to continuously send the location information to the
15 location service module.

16
17 **48.** The method of claim 43, wherein one or more of the location
18 providers are configured to periodically send the location information to the
19 location service module.

20
21 **49.** The method of claim 48, wherein the one or more location providers
22 are configured to send the location information at specified times.

1 **50.** The method of claim 48, wherein the one or more location providers
2 are configured to send the location information on the occurrence of specified
3 events.
4

5 **51.** One or more computer-readable media having computer-readable
6 instructions thereon which, when executed by a mobile computing device,
7 implement the method of claim 43.
8

9 **52.** A method of determining the location of a mobile computing device
10 comprising:
11

12 providing multiple different location providers that are configured to
13 provide location information that pertains to a current location of the computing
14 device;
15

16 monitoring one or more of the location providers;
17

18 assigning an accuracy parameter to location information that is provided by
19 one or more providers, the accuracy parameter providing a measure of the
20 accuracy of a provider's location information; and
21

22 sending the location information and accuracy parameter to a location
23 service module on the mobile computing device, the location service module being
24 configured to use the location information and the accuracy parameter to ascertain
25 a current device location.
26

1 **53.** The method of claim 52 further comprising, responsive to the
2 monitoring, notifying the location service module on the occurrence of an
3 operation irregularity of a location provider.

4

5 **54.** The method of claim 52 further comprising receiving a location
6 query and responding to the location query with the location provider.

7

8 **55.** The method of claim 52, wherein one or more of the location
9 providers continuously send location information to the location service module.

10

11 **56.** The method of claim 52, wherein one or more of the location
12 providers periodically send location information to the location service module.

13

14 **57.** The method of claim 56, wherein the one or more location providers
15 send the location information at specified times.

16

17 **58.** The method of claim 56, wherein the one or more location providers
18 send the location information on the occurrence of specified events.

19

20 **59.** One or more computer-readable media having computer-readable
21 instructions thereon which, when executed by a mobile computing device,
22 implement the method of claim 52.